ECOLOGICAL SURVEY OF THE ADORNI CANDIDATE RESEARCH NATURAL AREA, HUMBOLDT COUNTY, CALIFORNIA

PSW FOREST AND RANGE EXPERIMENT STATION
STATION LIBRARY COPY

John O. Sawyer, Department of Biology, Humboldt State University, Arcata, CA 95521[1]

The proposed Adorni Research Natural Area is on the Orleans Ranger District, Six Rivers National Forest. The RNA is nominated to represent the Port Orford cedar-Douglas fir type (SAF 231). The area of about 600 acres of slopes is drained by Aikens Creek. It is located in Sections 25 and 26, T.10N. R.4E., about 30 miles north of Willow Creek via State Route 96 and Forest Road 13N01. The eastern boundary contacts 13N01 (Fig. 1) where there is parking for one or two cars. Most easy access is by the ridge south of Aikens Creek where there is an intermittent trail.

The general topography is one of steep (30-70%) slopes descending directly to streams. Terraces are minor or non-existent. Ridges in the lower, eastern portion are abrupt. In the Area's western portion, ridges become broader and terrain moderates. Active slumping occurs along both of the major streams creating even steeper, more unstable slopes. This is especially the case along Aikens Creek. Elevations range from 600 to 2400 ft.

Geologically the area is underlain by metamorphosed sedimentary rocks of the Upper Galice Formation. Rocks are phyllites and shists with outcroppings of sheared, black slate. Such parent materials regionally develop Sheetiron and Hugo soil complexes (Laacke 1979). This area, as part of the Orleans quadrangle (Fig. 2), has been soil-vegetation surveyed (Rocky et al. 1966). Most of the proposed RNA is mapped as 820/2-3M (Sheetiron, shallow, unstable, 50-70% slopes), and aptly described:

---

[1] Field assistance by Jane Cole, Michael Erickson and Kevin Sawyer.

LIBRARY U.S. FOREST SERVICE BERKELEY

"The combination of steep slopes, deep, severe fracturing of the rock, and excess water results in surface creeps and large scale landslides. These areas are characterized by hummocky surface relief and active rotational slides. Leaning trees, the occurrence of Port Orford cedar, and young growth of trees with a high incidence of windthrow are typical of these areas." (Rocky et al. 1966).

The Sheetiron series is described as a Dystric Xerochrept (Laacke 1979). Local soils differ from the typifying pedon by having a deeper, dark gray C horizon developed from fractured slates.

A small portion of the area (20%) is mapped as 812m/3-2 (Hugo, moderately shallow, 30-50% slopes). The Hugo series is described as a Typic Dystrochrept (Laacke 1979). These soils are developed in areas of more moderate relief from shistose parent materials (Fig. 2).

The vegetation for both soils is mapped as site III, semidense oldgrowth of Douglas fir, Port Orford cedar, madrone and tanoak (DOMT, 0221 III)[2] by Rocky et al. (1966). Such stands can be classified as Klamath Region

---

2 Age structure of conifer timber stands

0 - Oldgrowth stands with mature trees growing 80% or more of commercial conifer canopy,

Density of conifer timber stands

Sawlog stand density

2 - Semidense sawlog stand, crowns of sawlog-sized commercial conifers 50-80% of ground,

Total stand density

2 - Semidense total stand, crowns of all-sized commercial conifers 50-80% of ground,

Density of total woody vegetation cover

1 - Dense woody vegetation cover, the canopy of all trees and shrubs >80%,

Site quality of timber croplands

III - Pacific northwest mapping site rating; 130-150' tree height for Douglas fir at 100 years.

Pseudotsuga-hardwood forest (Sawyer et al. 1977). They mention that Port Orford cedar is common in ravines of metamorphic terrain, but more common on ultramafic parent materials.

The climate of the Adorni site may be suggested by reviewing data from Orleans and Weitchpec stations (Rocky et al. 1966). Weitchpec is at the confluence of the Trinity and Klamath Rivers and may be more maritime due to the Klamath River gap to the west. Orleans is lower in elevation than Adorni (Table 1).

Summer temperatures are expected to be in the 80's (^{o}F) and 90's (^{o}F); winter temperatures in the low 30' (^{o}F). Precipitation (about 70"/year) is concentrated in the winter period with November, December, January, and February receiving in excess of 10"/month, much of it snow which soon melts. Soil moisture is typically depleted by mid-July for zonal sites.

METHODS

Vascular plants of the area were inventoried in late June 1979 during a preliminary reconnaissance of the area. Only specimens of unknown taxa were collected. Voucher specimens are deposited at the Humboldt State University Herbarium (HSC). Reconnaissance suggested two forest types in the part of the area not salvaged-logged in 1965 (Fig. 3). These types were described by Ward and Horton (1978) as Douglas fir-Port Orford cedar and tanoak-madrone. Sampling in May and July 1980 was done accordingly.

Species composition of the understory and ground layer was sampled using 30 relevés. In the undisturbed forest areas relevés were taken at the 20 locations where trees (> 4" dbh) were also sampled. Due to steep topography, the point-centered quarter method (Mueller-Dombois and Ellenberg 1974) was

employed to sample tree density, basal area, and frequency. Distances were measured by rangefinder; tree diameters were taped. Height and age of only two trees were obtained. Steep slopes combined with heavy understories made the trees available for measurement. Ten additional relevés were taken in portions disturbed by 1965 salvage logging.

RESULTS

Some 131 taxa were recognized in the proposed RNA (Appendix I). Most are typical of low elevation, Klamath Region Pseudotsuga-hardwood forests. Two species, Erythronium citrinum and Lilium rubescens, which are listed by CNPS (Smith et al. 1980) as rare but not endangered, occur in the area.

The 30 relevés were compiled to form association tables which suggest two rather distinct forest types (Table 2), here named Pseudotsuga menziesii/Goodyera oblongifolia and Lithocarpus densiflora/Rhamnus californica. A third of the relevés sample logged areas in the western portion of the area.

Pseudotsuga menziesii/Goodyera oblongifolia is a typical example of the two-storied Pseudotsuga-hardwood forests of the region (Fig. 4). A higher canopy of Douglas fir and Port Orford cedar contribute 56 and 44 trees/acre respectively. Basal area for Douglas fir is higher at 335 ft^2/acre than the less dense Port Orford cedar at 167 ft^2/acre. A lower canopy is dominated by tanoak (80 trees/acre, 51 ft^2/acre) with larger madrone (16 trees/acre, 95 ft^2/acre) and a few Umbellularia californica (4 trees/acre, 1 ft^2/acre). All species are reproducing in these uneven-aged stands (Table 2). One 135' tall (22.5"dbh) Port Orford cedar was estimated to be 175 years old.

The dense understory of primarily Vaccinium ovatum and patches of Gaultheria shallon includes a variable mix of herbs as Goodyera oblongifolia, Trillium ovatum, Oxalis oregana, Clintonia uniflora and Heirochloe occidentalis missing from the apparently drier Lithocarpus/Rhamnus type.

Lithocarpus densiflora/Rhanmus californica is a more open forest differing less in tree composition than is structure (Fig. 5). Roughly a third more trees (273 trees/acre) are small in stature and contribute to less basal area (282 ft^2/acre). Tanoak and madrone are more important than in Pseudotsuga/Goodyera and Port Orford cedar is only a minor component. In addition canyon live oak, sugar pine and incense cedar contribute to the canopy (Table 3). Reduced productivity is suggested by a 260-year-old Port Orford cedar which was 61' tall and 13.4" dbh.

Vaccinium ovatum is still common in the understory, but with reduced cover. It is frequently joined by Rhamnus californica and Arctostaphylos manzanita. Toxicodrendon diversilobum and Xerophyllum tenax become abundant as well (Table 2).

Both types appear climax with compositional and structural differences probably due to site. Environmental differences between Pseudotsuga/Goodyera and Lithocarpus/Rhamnus appear to be one of deep soils for the former and thin, rocky soils for the latter. Slopes are comparably steep. Local slope instability, though, is much more apparent in Pseudotsuga/Goodyera, where trees lean in many directions and recently downed trees form frequent canopy gaps. The active slump mentioned by Ward and Horton (1978) is colonized by alder, tanoak, Douglas fir and Port Orford cedar (Figs. 6, 7).

The area salvaged-logged in 1965 is part of the Pseudotsuga/Goodyera type. Disturbed areas show a heterogeneous mix (Table 2) depending on degree of disturbance. Ceanothus velutinus and Alnus rhombifolia are common with

dense Vaccinium ovatum and reproduction of Douglas fir, madrone and tanoak. Whipplea modesta is the common and abundant ground cover. Port Orford cedar is reproducing in locally wet areas.

Animal use in the area is apparently light. Bear sign was seen; deer trails suggest only some use. Workings by pileated woodpeckers were noticed, and the area may be suitable habitat for spotted owls.

EVALUATION OF THE AREA

The area is typical of low elevation Klamath Region country. The Port Orford cedar stand is rather extensive, although neither dense nor continuous. The better trees are away from the area's boundaries, reducing the risk of poaching and root rot. Logging detracts from the upper portions of the area, though it is not as damaging as expected. Disturbance is localized to roads and trails to individual trees. This leaves much of the western portion undisturbed.

Adorni is representative of ravine stands on metamorphic parent materials in the southern range of the species. It should be classified as a Research Natural Area.

Literature Cited

Laacke, R. J. 1979. California forest soils. Div. Agric. Sci., Univ. Calif. Publ. 4094. 181p.

Mueller-Dombois, D. and H. Ellenberg. 1974. Aims and methods of vegetation ecology. J. Wiley & Sons. 547p.

Rocky, R. E., K. E. Bradshaw, and A. G. Sherrell. 1966. Interim report, soil-vegetation survey, Orleans District, Six Rivers National Forest. 183p. Maps.

Sawyer, J. O., D. A. Thornburgh, and J. R. Griffin. 1977. Mixed evergreen forest. pp. 359-381. In M. G. Barbour and J. Major (eds.). Terrestrial vegetation of California. J. Wiley & Sons.

Smith, J. P., R. J. Cole, and J. O. Sawyer. 1980. Inventory of rare and endangered vascular plants of California. Special Publ. No. 1 (2nd ed.). California Native Plant Society. 115p.

Ward, G. A. and L. E. Horton. 1978. A field reconnaissance of the proposed Adorni RNA. Letter to PSW/R5 RNA Committee. 4p,

Figure 1. Location of proposed Adorni Research Natural Area, Orleans quadrangle, Humboldt County, California.

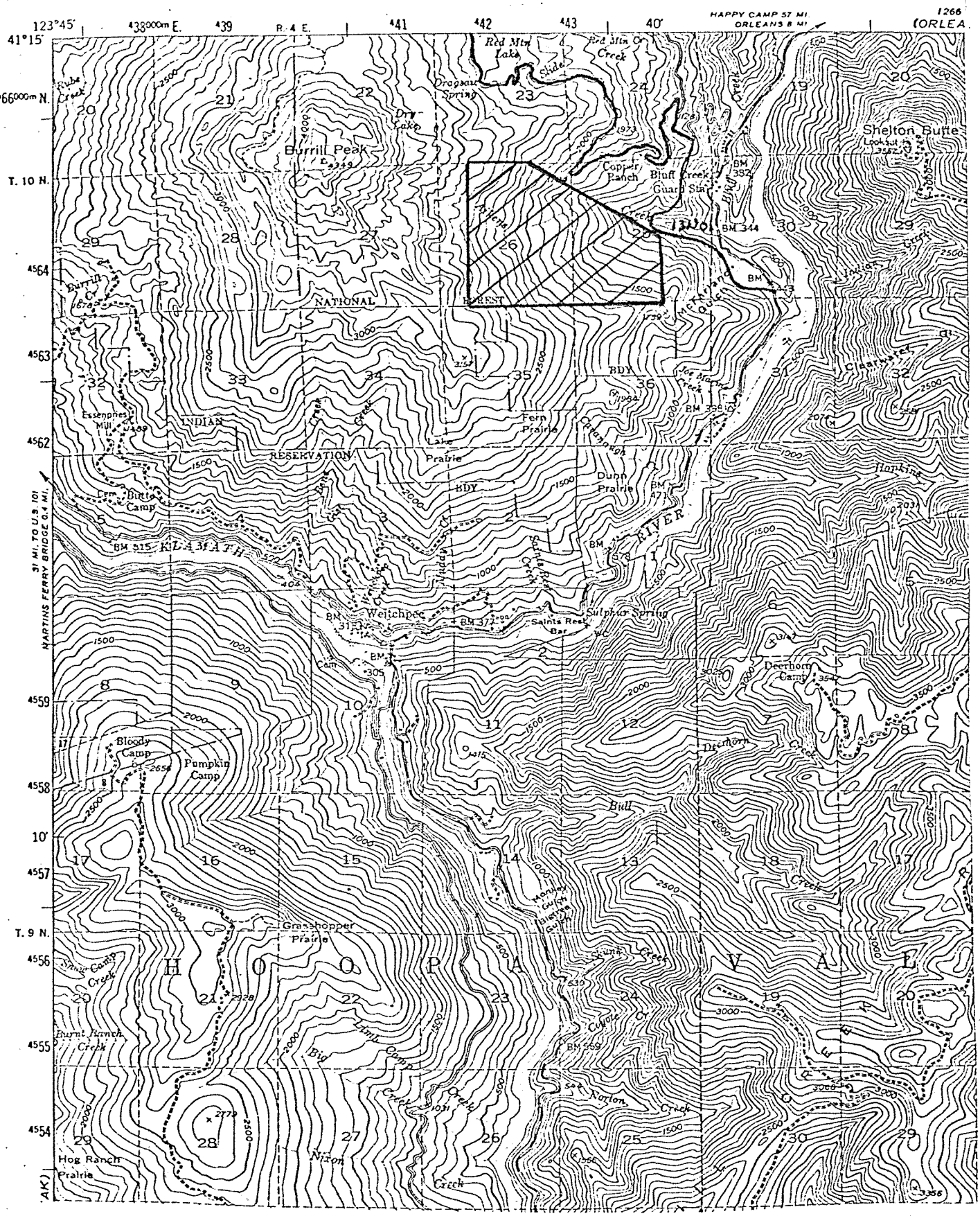


Figure 2. Soil-vegetation map of the proposed Adorni Research Natural Area. From Rocky et al. 1966. Contour interval 100'.

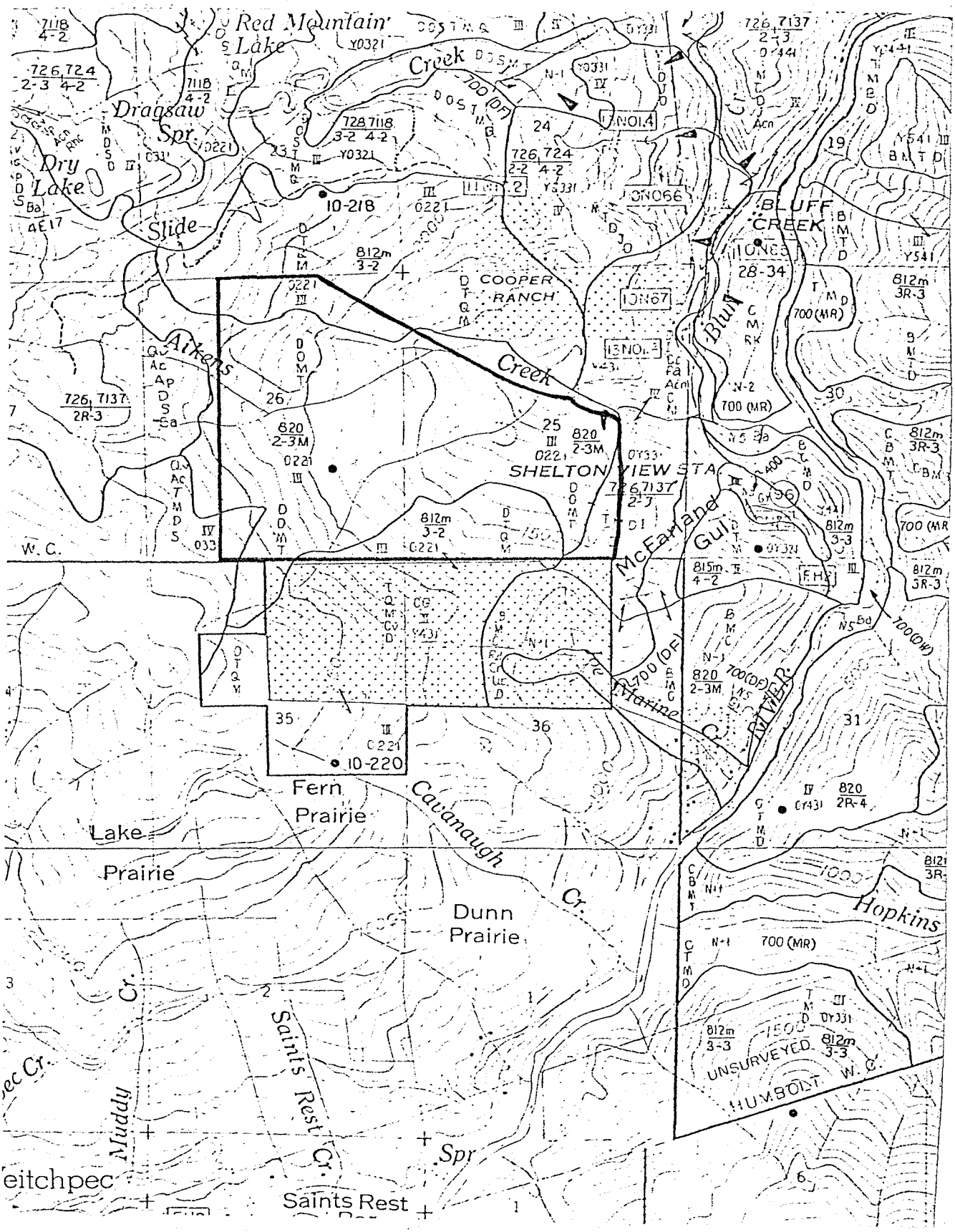
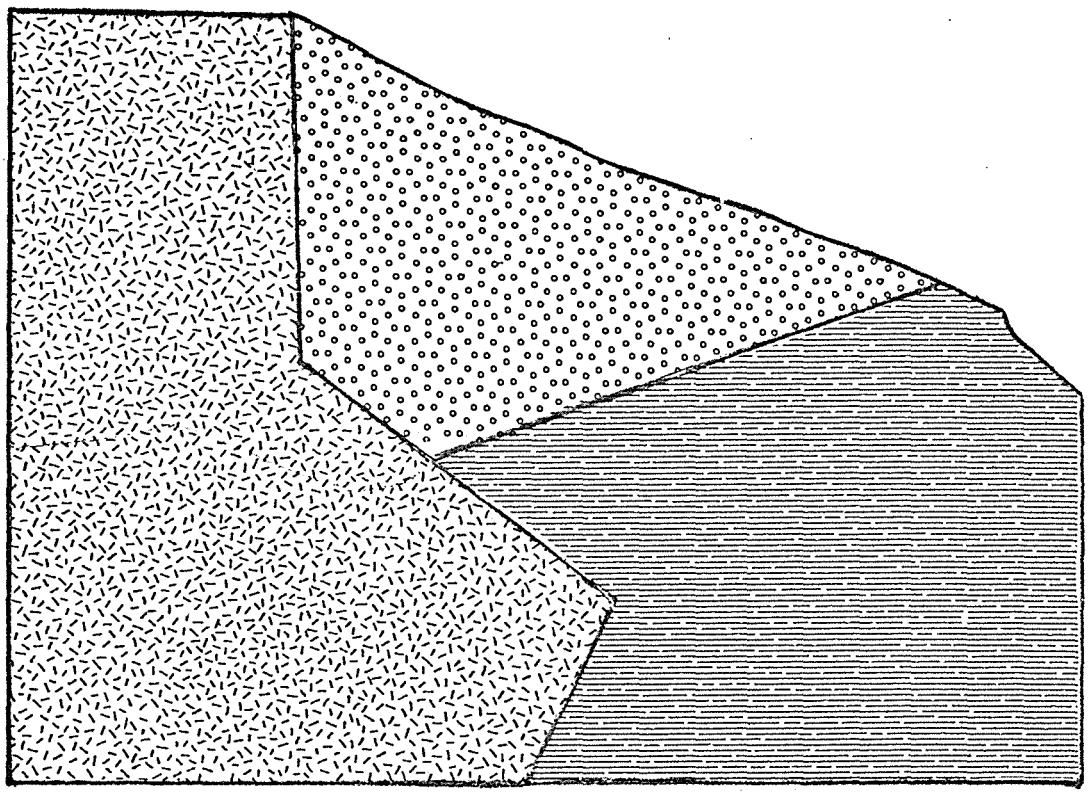
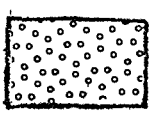


Figure 3. Vegetation map of the proposed Adorni Research Natural Area.



Pseudotsuga menziesii/Goodyera oblongifolia type

Area salvaged logged in 1965



Lithocarpus densiflora/Rhamnus californica type

Figure 4. General structure of Pseudotsuga menziesii/Goodyera olongifolia forest type.

Figure 5. Mature trees Chamaecyparis lawsoniana and Pseudotsuga menziesii in the Lithocarpus densiflora/Rhamnus california forest types.

Figure 6. Recent slump with Alus rhombifolia reproduction.

Figure 7. Chamaecyparis lawsoniana and recent fallen trees in the Pseudotsuga menziesii/Goodyera oblongifolia forest type.

Table 1

Climatic data for nearby stations to Adorni Candidate Research Natural Area. From R. E. Rocky, K. E. Brashaw and A. G. Sherrell. 1966. Interim Report, Soil-Vegetation Survey, Orleans Ranger District, Six Rivers National Forest.

	Orleans	Weitchpec
County	Humboldt	Humboldt
Elevation	403 feet	1700 feet
Temperature		
Highest	113°F	102°F
Mean maximum		
July	94.0	83.5
January	49.9	45.0
Year	71.1	64.5
Mean temperature		
July	72.9	67.6
January	42.0	38.0
Year	56.9	52.4
Mean minimum		
July	51.8	51.7
January	34.1	30.9
Year	42.6	40.2
Lowest	15.0	16.0
Precipitation		
July	.24 inches	.59 inches
August	.08	.06
September	.87	2.12
October	3.76	3.76
November	6.53	12.78
December	9.79	11.30
January	9.76	16.30
February	7.39	10.47
March	6.25	5.77
April	3.08	5.04
May	2.50	3.79
June	.97	1.04
Season	51.22	73.38
Average snowfall		
Season	6.2 inches	51.5 inches
Dry date[a]	July 2	July16

a. The date when stored soil moisture has been depleted in a typical year.

Table 2. Presence (P%) and modal cover/abundance (C/A) for all sampled understory trees, shrubs and herbs. Data from 30 releves. Cover/abundance scale: 1= one individual, 2= sparse and less than 10%, 3= common and less than 10%, 4= 10-25%, 5= 25-50%, 6=50-75%, 7= more than 75%. Applicable subspecific nomenclature in Appendix I. PSME/GOOB= *Pseudotsuga menziesii/Goodyera oblongifolia*, logged PSME/GOOB, LIDE/RHCA= *Lithocarpus densiflora/Rhamnus californica* forest types.

Taxa	PSME/GOOB	PSME/GOOB logged	LIDE/RHCA
Understory trees			
Chamaecyparis lawsoniana	2.70		
Lithocarpus densiflora	3.100	4.90	5.70
Arbutus menziesii	3.50	3.80	4.30
Pseudotsuga menziesii	2.70	4.80	2.80
Umbellularia californica	2.80	4.10	3.50
Pinus lambertiana	1.10		2.50
Calocedrus decurrens			2.90
Quercus chrysolepis			4.50
Taxus brevifolia	2.30		1.10
Shrubs and vines			
Gaultheria shallon	3.50	3.40	
Mahonia nervosa	3.40	2.10	
Lonicera hispidula	2.70	3.20	2.30
Vaccinium ovatum	5.90	5.100	3.90
Toxicodendron diversilobum	2.20	2.50	3.80
Rhamnus californica			3.90
Arctostaphylos manzanita		1.10	4.50
Rosa gymnocarpa	2.30		2.30
Cornus sessile	2.10	2.30	
Arctostaphylos columbiana		2.20	3.20
Ceanothus integerrimus			2.10
Arctostaphylos nevadensis			2.10
Holodiscus discolor		2.10	4.10
Rubus vitifolius		2.20	2.10
Ceanothus velutinus		4.90	
Alnus rhombifolia		5.30	
Salix scouleriana		3.20	
Rubus parviflorus		1.10	
Fraxinus latifolia		3.10	
Ribes sanguineum		2.10	
Vaccinium parviflorum		2.20	
Rhododendron macrophyllum		2.10	
Rubus leucodermis		2.10	
Baccharis pilularis		2.10	
Chrysolepis chrysophylla		2.10	

Table 2 continued

Taxa	PSME/GOOB	PSME/GOOB logged	LIDE/RHCA
Herbs			
Goodyera oblongifolia	2.70		
Chimaphila menziesii	2.60		
Trillium ovatum	2.60		
Oxalis oregana	2.60		
Hierochloe occidentalis	2.60		
Clintonia uniflora	2.40		
Polystichum imbricans	3.70	2.20	2.10
Vancouveria planipetala	2.50		2.10
Smilacina racemosa	2.40		2.20
Trientalis latifolia	3.50	2.20	2.60
Iris tenax	2.30		2.40
Polygala cornuta	2.20	2.30	2.50
Xerophyllum tenax	2.10	2.20	3.90
Chimaphila umbellata			2.40
Polygala californica	2.30		2.20
Lilium rubescens	2.30	1.10	2.10
Boschniakia strobliaeca	1.20		3.10
Pteridium aquilinum	1.10	2.40	2.30
Viola sempervirens	1.10		
Heuchera micrantha	2.10		
Calypso bulbosa	1.10		
Hieracium albiflorum			2.20
Microsteris gracilis			3.10
Eriophyllium lanatum			3.20
Luzula subsessilis		2.10	3.20
Melica bulbosa			1.10
Festuca idahoensis			1.10
Piperia unalascensis			
Stachys rigida		2.10	

Table 3. Stand composition of canopy (> 4 " dbh) trees for the Pseudotsuga menziesii/Goodyera oblongifolia (PSME/GOOB) and the Lithocarpus densiflora/Rhamnus californica (LIDE/RHCA) forest types. D = density, trees/acre; BA = basal area, square feet/acre; F = frequency, percent.

	PSME/GOOB			LIDE/RHCA		
	D	BA	F	D	BA	F
Chamaecyparis lawsoniana	44	167	60	13	27	20
Pseudotsuga menziesii	56	335	70	49	103	60
Lithocarpus densiflora	80	51	70	96	35	80
Arbutus menziesii	16	95	20	60	34	70
Pinus lambertiana				33	68	40
Calocedrus decurrens				13	10	20
Quercus chrysolepis				9	5	10
Umbellularia californica	4	1	10			
Stand	200	649		273	282	

Appendix I. Taxa recognized within the proposed Adorni Research Natural Area. Collected plants were identified using the facilities of the Humboldt State University Herbarium (HSC). Vouchers are deposited there. Nomenclature follows P. Munz. 1959. A California flora. Univ. Calif. Press, Berkeley and J. P. Smith and J. O. Sawyer. 1978. Keys to the families and genera of vascular plants in northwest California. Mad River Press, Arcata CA.

Aceraceae

Acer circinatum
Acer macrophyllum

Anacardiaceae

Toxicodendron diversilobum

Apocynaceae

Apocynum androsaemifolium

Araliaceae

Aralia californica

Aristolochiaceae

Asarum caudatum

Aspidiaceae

Athyrium filix-femina var. *californicum*
Polystichum imbricans
Polystichum munitum

Berberidaceae

Mahonia nervosa

Betulaceae

Alnus rhombifolia
Corylus cornuta var. *californica*

Blechnaceae

Woodwardia fimbriata

Caprifoliaceae

Lonicera hispidula var. *vacillans*

Caryophyllaceae

Silene californica

Compositae

Agoseris aurantiaca
Anaphalis margaritacea
Arnica cordifolia
Arnica discoidea
Baccharis pilularis ssp. consanguinea
Erigeron foliosus var. hartwegii
Eriophyllum lanatum
Hieracium albiflorum
Hypocheris radicata
Petasites frigidus var. palmatus
Taraxacum officinale

Cornaceae

Cornus nuttallii
Cornus sessilis
Cornus stolonifera

Cupressaceae

Calocedrus decurrens
Chamaecyparis lawsoniana

Cyperaceae

Carex spp.

Ericaceae

Arbutus menziesii
Arctostaphylos columbiana

Arctostaphylos manzanita
Arctostaphylos nevadensis
Arctostaphylos viscida
Gaultheria shallon
Rhododendron occidentale
Rhododendron macrophyllum
Vaccinium ovatum
Vaccinium parviflorum

Equisetaceae

Equisetum arvense
Equisetum hymale var. robustum

Fagaceae

Chrysolepis chrysophylla
Lithocarpus densiflora
Quercus chrysolepis
Quercus vaccinifolia

Gentianaceae

Centaurium venustum

Gramineae

Agrostis hallii
Aira praecox
Bromus rigidus

Deschampsia elongata
Elymus glaucus
Festuca idahoensis
Glyceria elata
Hierochloe occidentalis

Holeus lanatus
Lolium multiflorum
Melica bulbosa
Taeniatherum asperum

Grossulariaceae
Ribes roezlii var. cruentum
Ribes sanguineum var. sanguineum

Hydrangeaceae

Whipplea modesta

Hydrophyllaceae

Phacelia bolanderi

Hypericaceae

Hypericum perforatum

Iridaceae

Iris tenax

Juncaceae

Luzula subsessilis

Labiatae

Stachys rigida

Lauraceae

Umbellalaria californica

Leguminosae

Lotus purshianus

Liliaceae

Clintonia uniflora
Disporum hookeri var. trachyandrum
Eryothronium citrinum
Lilium rubescens
Smilacina racemosa var. amplexicaulis
Trillium ovatum
Xerophyllum tenax

Monotropaceae

Allotropa virgata
Pterospora andromedea

Oleaceae

Fraxinus latifolia

Onagraceae

Epilobium minutum

Orchidaceae

Calypso bulbosa ssp. occidentalis
Goodyera oblongifolia
Piperia unalascensis

Orobanchaceae

Boschniakia strobilacea

Oxlidaceae

Oxalis oregana

Pinaceae

Pinus lambertiana
Pseudotsuga menziesii

Podophyllaceae

Achlys triphylla
Vancouveria planipetala

Polemoniaceae

Microsteris gracilis

Polygalaceae

Polygala californica
Polygala cornuta

Polypodiaceae

Polypodium californicum

Portulaceae

Montia siberica

Pteridaceae

Adiantum pedatum
Aspidotis densa
Pityrogramma triangularis
Pteridium aquilinum var. pubescens

Primulaceae

Trientalis latifolia

Pyrolaceae

Chimaphila menziesii
Chimaphila umbellata var. occidentalis
Pyrola picta

Ranunculaceae

Aquilegia formosa

Rhamnaceae

Ceanothus cuneatus
Ceanothus integerrimus
Ceanothus thyrsiflorus
Ceanothus velutinus
Rhamnus californica

Rosaceae

Aruncus vulgaris
Amelanchier alnifolia
Crataegus douglasii
Heteromeles arbutifolia
Holodiscus discolor
Rosa gymnocarpa
Rubus laciniatus
Rubus leucodermis
Rubus parviflorus
Rubus procerus
Rubus vitifolius

Rubiaceae

Galium triflorum

Saliçaceae

Salix scouleriana

Saxifragaceae

Heuchera micrantha
Tellima grandiflora

Scrophulariaceae

Mimulus moschatus
Veronica americana

Taxaceae

Taxus brevifloria

Umbelliferae

Torilis arvensis

Violaceae

Viola sempervirens